Los Alamos National Laboratory

UNIVERSITY OF CALIFORNIA

Environmental Restoration

Environmental Restoration Project
MS M992
Los Alamos, New Mexico 87545
505-667-0808/FAX 505-665-4747

Date: September 13, 1996
Refer to: EM/ER:96-482

Mr. Ted Taylor
Los Alamos Area Office
US Department of Energy, MS A316
Los Alamos, NM 87544

SUBJECT: INTERIM ACTION PLAN FOR ACTIVITIES AT TA-21, PRS 21-011(k)

Dear Ted:

Enclosed for your records please find a copy of the Interim Action Plan for activities at Technical Area 21, Potential Release Site 21-011(k). These activities are planned for completion in Fiscal Year 1997. Informational copies of this plan are being distributed to the regulators.

If you have any questions, please call Garry Allen at (505) 667-3394 or Bonnie Koch at (505) 665-7202. Thank you for your cooperation in this matter.

Sincerely,

Jorg Jansen
Program Manager

JJ/bp

Enclosure: (1) Interim Action Plan for TA-21, Potential Release Site 21-011(k)

Cy (w/ enc.):
G. Allen, CST-18, MS E525
B. Koch, LAAO, MS A316
B. Garcia, NMED-HRMB (2 copies)
D. Griswold, AL-ERD, MS A906
J. Harry, EES-5, MS M992
E. Hoditschek, NMED-HRMB
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Interim Action Plan for Potential Release Site

21-011(k)

Discharge System

Field Unit 1

Environmental Restoration Project

September 1996

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-96-1609

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1.0 RATIONALE AND OBJECTIVE OF INTERIM ACTION

This interim action plan addresses radionuclides present in the soil on and adjacent to steep hillsides at potential release site (PRS) 21-011(k) at Los Alamos National Laboratory (LANL) Technical Area (TA) 21. This plan describes the site and its history; radionuclides found at the site; the proposed interim action; confirmatory sampling, monitoring, and waste management issues; and the schedule and cost for completing the interim action.

The rationale for conducting an interim action at PRS 21-011(k) is two-fold. First, this site does not have long-term storm water controls, other mitigating containment, or transport-inhibiting structures in place. Transport of contaminated sediments from the outfall area to Delta Prime (DP) Canyon has occurred and may continue to occur. Cesium-137 contaminated sediments have been recently identified at the confluence of DP Canyon and Los Alamos Canyon, and elevated cesium levels farther downstream in Los Alamos Canyon have been noted in aerial radiological surveys. The suspected source of this contamination is PRS 21-011(k).

The second reason for conducting this interim action is that exposure rates near the outfall discharge point exceed 1 000 µR/hr, which is approximately equal to a dose equivalent from gamma-emitting radionuclides of 1 mrem/hr. Under a recreational scenario (for a trail user who spends approximately 14 days of the year in the area), this is a dose equivalent of approximately 340 mrem/yr, well above the Department of Energy (DOE) effective dose equivalent limit of 100 mrem/yr. In addition, contaminants in the soil exceed LANL's Environment, Safety, and Health (ESH) division's soil contamination area posting limits (levels, based on an industrial worker scenario, at which warning signs must be posted). The maximum radionuclide levels for chemicals of potential concern (COPCs) within the proposed boundaries of excavation for this interim action are presented in Table 1.0-1.

The objective of the proposed interim action at PRS 21-011(k) is to remove the most highly contaminated soil and install storm water controls. This action will reduce the transport of contaminated material into DP Canyon and reduce the potential exposure of contaminants to workers and the public.

In the future, PRS 21-011(k) is expected to be used for recreational purposes. If this proposed interim action does not meet the dose limits calculated for the recreational scenario, for which cesium-137 is estimated to be 40 pCi/g, then a follow-on voluntary corrective action will be taken when budget and schedule allow a final remedy. A voluntary corrective action will require preparing a detailed report that will include a discussion of confirmation sampling, a risk assessment, and a discussion of monitoring.

TABLE 1.0-1

MAXIMUM RADIONUCLIDE LEVELS AT PRS 21-011(k)

LOCATION	RADIONUCLIDE	MAXIMUM LEVEL		ESH-1 POSTING LIMIT[b] (pCi/g)	SCREENING ACTION LEVEL[c] (pCi/g)
		ACTIVITY (pCi/g)	ESTIMATED DOSE[a] (mrem/y)		
21-1416	Americium-241	2 600	1 000	265	22
21-1416	Plutonium-238	2 200	700	315	27
21-1416	Plutonium-239	46 000	16 000	287	24
21-1416	Strontium-90	1 800	30	6590	4.4
21-1597	Cesium-137	3 226	14 000	22.5	5.1

[a] Estimated effective dose equivalent calculated under an industrial worker scenario, using assumptions of LaFrate (1996).
[b] Activity concentration of a radionuclide which, if it were the only contaminant, would result in 100 mrem/yr effective dose equivalent under an industrial worker scenario (LaFrate 1996).
[c] Activity concentration of a radionuclide which, if it were the only contaminant, would result in a 10 mrem/yr effective dose equivalent under a residential scenario (EPA 1995, 1307).

A voluntary corrective action (VCA) will be supported by this interim action plan. The options discussed in this plan will (1) remove the immediate threat to the health and safety of workers who will perform the VCA; (2) stabilize the area, preventing contaminant run-on from the mesa top and contaminant run-off into DP Canyon (i.e., the VCA can be planned based on stable conditions); and (3) provide additional data (discussed in Section 4.0) so the VCA can be planned based on known conditions.

2.0 SITE DESCRIPTION AND CHARACTERIZATION DATA

PRS 21-011(k) is listed in the Laboratory's Hazardous and Solid Waste Amendments (HSWA) portion of the Resource Conservation and Recovery Act (RCRA) operating permit. Investigations to characterize PRS 21-011(k) were conducted in 1988, 1992, and 1993. The 1988 investigation is described in Section 15.4 of the TA-21 work plan (LANL 1991, 0689); the 1992 and 1993 investigations are described in Section 4.1 of the RCRA Facility Investigation (RFI) report (LANL 1995, 1261).

Several locations were sampled in 1992 and 1993 (Fig. 2.0-1); these investigations are summarized below.

In 1992, a radiation survey was conducted. Three locations identified by the radiation survey were sampled in 6-in. intervals to a depth of 12 in.

In 1993, a second radiation survey was conducted and used to select sampling locations. The survey identified three areas having relatively elevated gamma radiation (greater than 640 µR/hr) within a larger area having above-background gamma radiation (Fig. 2.0-1).

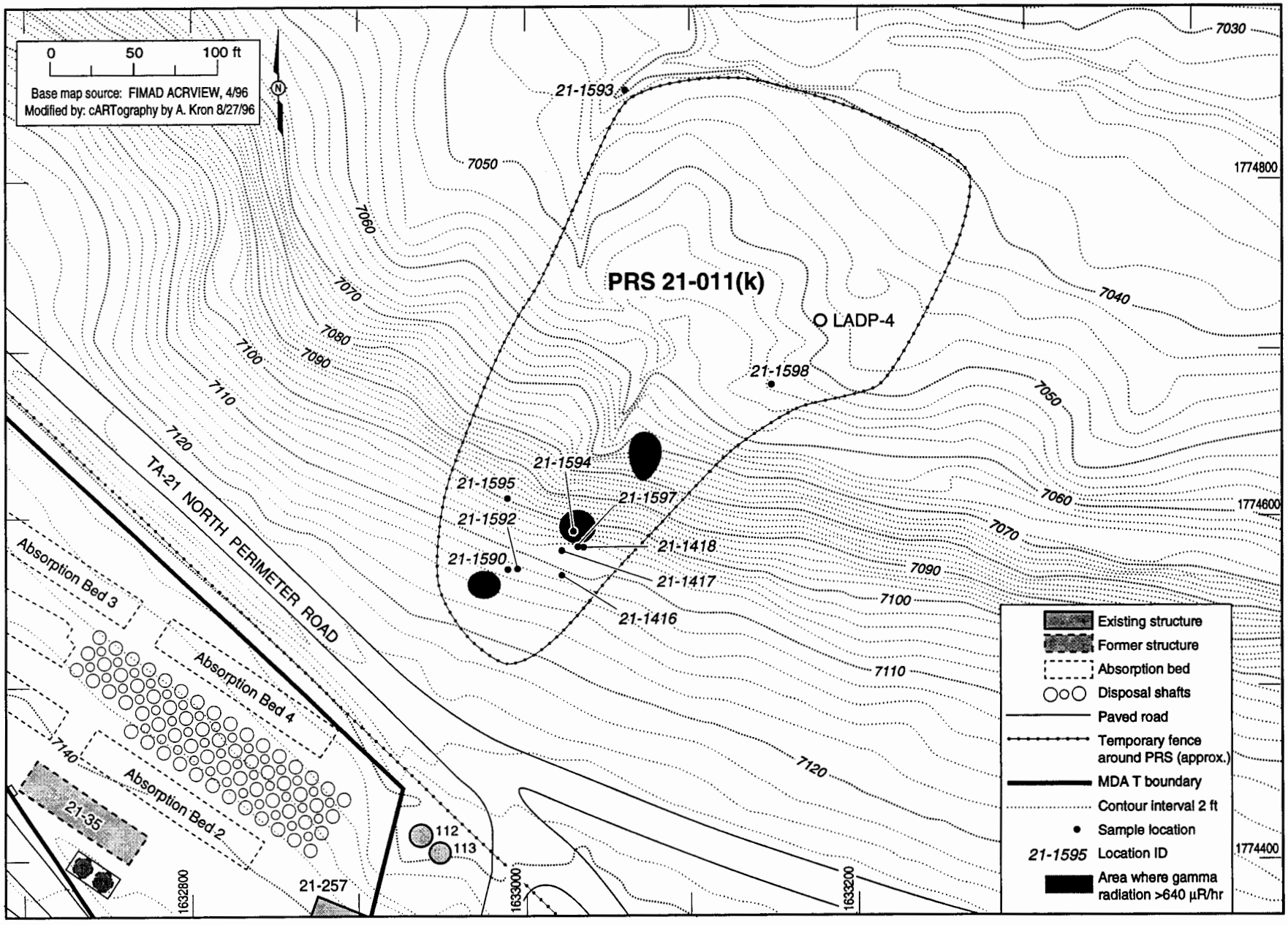

Fig. 2.0-1. Sample locations for PRS 21-011(k) from 1992 and 1993.

The 1993 investigation also included sampling at eight locations: at five of these locations, only the 0-to-6-in. interval was sampled; at three of these locations, the 0-to-6-in., 6-to-12-in., and 12-to-18-in. intervals were sampled. The 1993 analytical suite excluded inorganic analytes because they were not detected at levels of concern during the 1992 investigation. Results of the 1993 investigation confirmed 1992 findings that several radionuclides were present at levels greater than background and some at levels greater than screening action levels (SALs).

The results of investigations in 1988, 1992, and 1993 did not identify nonradioactive, RCRA-regulated, organic and inorganic chemicals greater than SALs; therefore, the PRS was recommended for no further action under HSWA (LANL 1995, 1261). This recommendation was approved by the New Mexico Environment Department (NMED) (LANL 1996). The following radionuclides, however, were found at levels greater than SALs and were recommended for further action: americium-241, cesium-137, plutonium-238 (found at levels greater than SALs in the 1992 investigation but less than SALs in the 1993 investigation), plutonium-239, and strontium-90 (LANL 1995, 1261). These are the COPCs at PRS 21-011(k).

3.0 INTERIM ACTION

The proposed interim action is to remove soil from areas where levels of radionuclides are greatest (including plutonium-239, the radionuclide found at the greatest concentrations) and to install storm water run-on and run-off controls. The rationale for performing this step is that removing contaminated soil from areas where radionuclide concentrations are greatest will quickly reduce worker and public health and safety concerns and will mitigate the potential for additional migration of the most contaminated material in storm water run-off.

Three excavation options are shown in Table 3.0-1 and Fig. 3.0-1. Although all three options will remove soil from areas where levels of plutonium-239 and other radionuclides are greatest, they are based on gamma radiation from cesium-137 measured with a shielded sodium iodide (NaI) gamma radiation detector. This method was chosen because cesium-137 is easily measured using a hand-held detector and has been found at PRS 21-011(k) to be collocated with other radionuclides (LANL 1995, 1261).

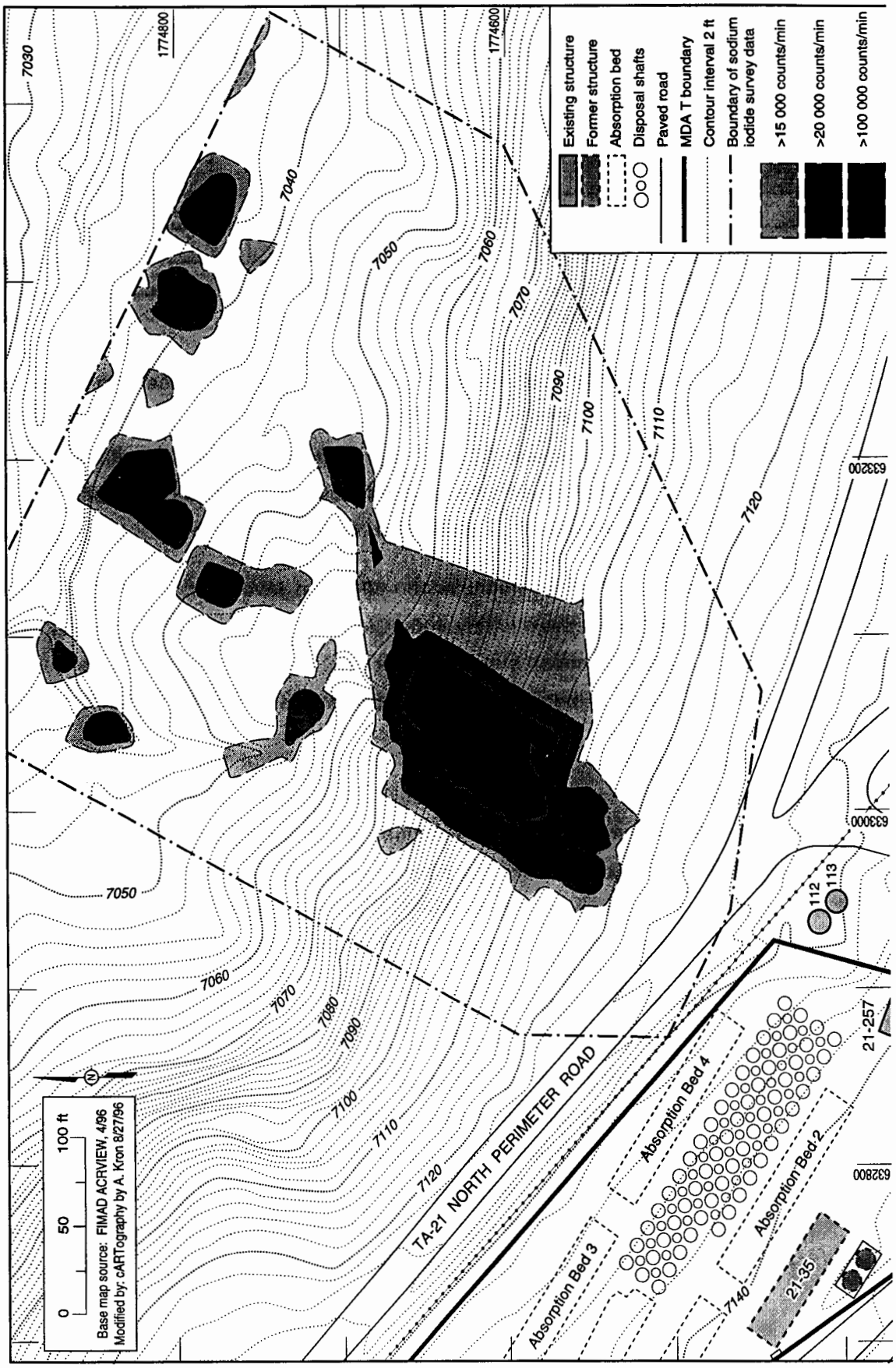

Fig. 3.0-1. Three proposed excavation options.

TABLE 3.0-1

EXCAVATION OPTIONS AT PRS 21-011(k)

If radiation levels in remaining soil are less than	The estimated volume (yd^3) of excavated soil will be[a]	The estimated residual concentration of cesium-137 (pCi/g) will be
100,000 cpm	180	400
20,000 cpm	800	60
15,000 cpm	1,300	40

[a] Assuming an average excavation depth of 1 ft.

The three options are to remove soil where gamma radiation levels exceed the following levels: 100 000 counts per minute (cpm), 20 000 cpm, or 15 000 cpm. Current field and funding conditions (such as ease of access to the excavation areas, speed at which excavation is completed, available funding to extend excavation, and cost and availability of waste disposal alternatives) will be assessed to determine which option is applied.

- Removing soil exceeding the 100 000 cpm level will reduce levels of cesium-137 to approximately 400 pCi/g. This option will remove soil that represents the most significant threat to health and safety and the environment while keeping waste disposal costs to a minimum.

- Removing soil exceeding the 20 000 cpm level will reduce levels of cesium-137 to approximately 60 pCi/g. This is within the range of cesium-137 levels in contamination identified at the confluence of DP Canyon and Los Alamos Canyon by using field gamma spectroscopy (ERG 1996). This option will leave soil levels of cesium-137 at PRS 21-011(k) that are approximately the same as those at other locations in DP Canyon.

- Removing soil exceeding the 15 000 cpm level will reduce levels of cesium-137 to less than 40 pCi/g, (the multiple radionuclide cleanup level under the recreational scenario and the single radionuclide cleanup level approved for mesa-top decontamination and decommissioning activities, based on a residential farmer scenario). This option will meet the dose limits calculated for the recreational land-use scenario and will constitute a final remedy for PRS 21-011(k). Under this option, the planned interim action will be changed to a voluntary corrective action, as discussed in sections 1.0 and 7.0.

Under any of these options, the contamination remaining in the area will still be greater than local background levels. However, removing the worst contamination in the main flow path of the drainage leading into DP Canyon will reduce the exposure magnitude and the potential for further downgradient transport.

The proposed interim action for PRS 21-011(k) will be implemented in two steps.

(1) Remove the major source term by removing soil from the excavation area shown in Fig. 3.0-1 and survey the remaining soil in the excavated area with gamma radiation detection instruments to confirm that radiation levels in the area are less than 100 000 cpm. Assess current field and funding conditions (as discussed previously) to determine whether additional soil should be excavated to meet one of the alternate levels (20 000 cpm or 15 000 cpm). The removal will be performed using heavy equipment suited to the type of excavation and terrain at the site. If radioactivity greater than 100 000 cpm (or the alternate level) remains in the excavated area, excavation and gamma surveys will continue until the 100 000 cpm radiation level (or the alternate level) has been met. Excavated soil will be disposed of as detailed in the waste management section (Section 6.0).

(2) Install storm water controls to control run-on and run-off and reestablish existing fences and postings to control access to contaminated areas. Restoration of the site will include regrading disturbed areas at the base of the mesa (where previous construction activities have altered the drainage pathways) to improve the operation and effectiveness of storm water control measures (details will be provided in a storm water pollution prevention plan). At this area, as well as the excavated area, disturbed soil will be stabilized using silt fences, geotextile mats, and reseeding to further mitigate sediment transport by storm water run-off. Silt fences and straw bales will be placed in drainages to slow the flow of run-off and allow sediments to settle out of the storm water before they reach the main stream channel. Run-on controls will be placed above the outfall to redirect storm water into adjacent drainages.

In the past, locations where the radiation exposure rate was greater than 50 µR/hr (approximately 3 ft above the ground surface) were determined to exceed the posting limit. A fence was placed at the boundary of these locations, but recent surveys indicate that the existing fence does not cover all areas that exceed 50 µR/hr. If necessary, existing fencing will be moved or new fencing will be installed in areas where the exposure rate exceeds 50 µR/hr.

During the interim action, all appropriate environment, safety, and health precautions will be taken as documented in spill prevention, health and safety, waste characterization, and storm water pollution prevention plans. These documents will be provided upon request.

4.0 MONITORING AND CONFIRMATORY SAMPLES

Confirmatory samples will not be collected to verify that cleanup levels have been met. All excavation decisions will be based on readings from radiation detection instruments. However to assist in planning the final remedy for PRS 21-011(k), five samples will be collected from locations where soil was excavated (one sample from each of the small areas of excavation and several samples from the largest area), and five samples will be collected from locations where soil was not excavated. These samples will be submitted for analyses to determine the relative proportions of radionuclides remaining in the soil (that is, the concentrations of other radionuclides at this site compared to cesium-137, which is the primary gamma-emitting radionuclide measured by the NaI gamma radiation detector). The analytical suite for these samples will include isotopic plutonium, strontium-90, and gamma-emitting radionuclides (including cesium-137 and americium-241) by gamma spectroscopy.

Under the agreement in principle (AIP) program, the NMED Surface Water Quality Bureau plans to install a storm water sampler a short distance downstream of PRS 21-011(k). After storm water run-off controls are implemented, a minimum of three samples of storm water will be collected and analyzed (either in coordination with the AIP program or independently) below PRS 21-011(k). Results from all these samples will be reviewed to assess the transport of contaminants from this site and determine the adequacy of storm water controls. If analyses indicate that radionuclides from PRS 21-011(k) are still being transported, additional storm water control measures will be designed and installed.

5.0 MAINTENANCE AND INSPECTION

Fences and postings will be inspected once per year and any deficiencies will be remedied immediately. Inspections of the storm water control measures will be conducted in accordance with the storm water pollution prevention plan. Deficiencies in storm water control measures identified during inspections will be remedied immediately.

6.0 WASTE MANAGEMENT

Assuming removal of soil exceeding the 100 000 cpm level and based on existing radiation survey data, the area to be excavated is expected to be approximately 60 x 80 ft. Soil depths in this area vary from 0 ft on exposed tuff areas to approximately 4 ft. Estimated waste volumes assume that an average 1-ft-thick layer of soil or tuff will be removed over the entire area. This results in a volume of approximately 4 800 ft^3 or 180 yd^3. Greater waste volumes will result from excavating to either of the alternate levels (20 000 cpm or 15 000 cpm); these volumes are shown in Table 3.0-1.

Waste characterization samples will be collected and submitted for gross alpha, beta, and gamma screening to determine the total activity per gram of excavated material before excavation. All excavated material will be low-level-radioactive waste; appropriate disposal locations (either LANL-owned or commercial) are available for such waste. It is possible that the concentration of radionuclides in the excavated material will exceed 2 nCi/g, resulting in restrictions on waste shipment. Appropriate shipping regulations will be followed based on the results of the waste characterization analyses.

Previous investigations indicate that nonradioactive organic and inorganic compounds are present at PRS 21-011(k) at levels less than background (or baseline) concentrations (LANL 1991, 0689; LANL 1995, 1261). However, compounds at these levels may be of concern under waste disposal regulations. An assessment of previous sample concentrations and their potential to cause excavated material from PRS 21-011(k) to be classified as mixed waste will be conducted before any excavation. Waste characterization samples for RCRA-regulated constituents will be collected, analyzed, and a waste determination will be made before excavation.

7.0 SCHEDULE AND COST

The current baseline cost estimate for the proposed interim action at PRS 21-011(k) is approximately $147 000. This estimate is based on the volume of waste that will result if soil exceeding the 20 000 cpm level is removed and disposed of onsite at TA-54.

The baseline cost estimate does not include removal of soil with radiation levels exceeding 15 000 cpm, which constitutes a final remedy and will require additional confirmatory sampling, risk assessment, and permanent storm water controls. This option was not considered in developing the baseline cost estimate because it was planned as a follow-on voluntary corrective action. If this excavation option is chosen, a revision to the baseline cost estimate will be proposed to change the scope of work and associated cost estimates.

The baseline cost estimate does not include offsite waste shipment or disposal costs. The onsite (TA-54) disposal costs are not significant in the baseline cost estimate.

Table 7.0-1 provides additional detail on the costs of the three excavation options (removal of soil with radiation levels exceeding 100 000 ppm, 20 000 ppm, and 15 000 ppm). In Table 7.0-1, the baseline cost estimate was added to costs of offsite waste shipment and disposal as appropriate. To determine when these costs apply, the waste acceptance criteria for Envirocare, a waste disposal site operator in Utah, were compared to the levels of radionuclides in soil at PRS 21-011(k). The comparison indicates that excavated soil with radiation levels less than 100 000 cpm can be shipped to Envirocare. Table 7.0-1 lists the three excavation options and the impact on the baseline cost estimate of waste disposal costs, which for Envirocare include \$216 per yd^3 for disposal and \$3 500 per 20 yd^3 for transportation.

The proposed interim action is scheduled to begin during the first week of September 1996. The interim action report is scheduled to be submitted to the DOE by the end of December 1996. The follow-on voluntary corrective action is scheduled for FY97.

TABLE 7.0-1

COST ESTIMATES FOR EXCAVATION OPTIONS

RADIATION LEVEL	ESTIMATED VOLUME (yd^3)	WASTE DISPOSAL SITE	IMPACT OF WASTE DISPOSAL ON BASELINE ESTIMATE	TOTAL ESTIMATED COST[a]
100 000 cpm[b]	180	TA-54	- $20 000[c]	$127 000
20 000 cpm	800	Envirocare	$312 800	$459 800
15 000 cpm	1 300	Envirocare	$508 300	$655 300

[a] Baseline cost estimate ($147 000) plus the impact of waste disposal costs.
[b] Exceeds the waste acceptance criteria for Envirocare.
[c] The reduction in cost from the baseline estimate reflects the decrease in estimated volume (980 yd^3 in the baseline estimate).

8.0 REFERENCES

EPA (US Environmental Protection Agency), September 1, 1995. "Region IX Preliminary Remediation Goals (PRGs) Second Half 1995," San Francisco , California. **(EPA 1995, 1307)**

ERG (Environmental Restoration Group, Inc.), 1996. "Phase Two of the Radiometric Survey of Pueblo and Los Alamos Canyon System (Field Unit 4, OU 1049)," Environmental Restoration Group, Inc., Albuquerque, New Mexico. **(ERG 1996)**

LaFrate, P., March 20, 1996. "ER Project Soil Area Posting Criteria (Mesa Tops and Canyon Bottoms)," Los Alamos National Laboratory Memo 96-ER/D&D-015, Los Alamos, New Mexico. **(LaFrate 1996)**

LANL (Los Alamos National Laboratory), May 1991. "TA-21 Operable Unit RFI Work Plan for Environmental Restoration," Volumes I – III, Los Alamos National Laboratory Report LA-UR-91-962, Los Alamos, New Mexico. **(LANL 1991, 0689)**

LANL (Los Alamos National Laboratory), January 1995. "Phase Report Addendum 1B and 1C Operable Unit 1106 RCRA Facility Investigation," Los Alamos National Laboratory Report LA-UR-94-4360, Los Alamos, New Mexico. **(LANL 1995, 1261)**

LANL (Los Alamos National Laboratory), July 1996. "Request for Supplemental Information on RFI Report for TA-21 and its Addendums," Memo from Benito J. Garcia, State of New Mexico Environment Department, Santa Fe, New Mexico, to G. Thomas Todd, DOE Los Alamos Area Office, Los Alamos, New Mexico, July 1, 1996. **(LANL 1996)**

INTERIM ACTION PLAN
APPROVAL/DISAPPROVAL FORM

PRS(s) 21-011(k)

The undersigned have reviewed the Interim Action Plan and believe that an Interim Action is appropriate.

FPL GR allen Date 12 Sept 96

FPC a i kreh Date 12 Sept. 96

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I, Theodore J. Taylor, DOE-LAAO, **APPROVE** ✓, **DISAPPROVE** _____ the accompanying Interim Action Plan for PRS(s) 21-011(k), TA-21.

The following reasons reflect the decision for disapproval:

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Signed: T J Taylor Date: 9/13/96